EPA Region 7 TMDL Review

TMDL ID: KS-NE-07-213_1 **Waterbody ID:** KS-NE-07-212_2, KS-NE-07-212_886, KS-NE-07-213_20, KS-NE-07-213_3, KS-NE-07-213_4, KS-NE-07-213_6, KS-NE-07-570_881, KS-NE-07-213_1, KS-NE-07-213_23, KS-NE-07-569_17, KS-NE-07-569_22, KS-NE-07-211_18, KS-NE-07-210_19,

Waterbody Name: SPRING RIVER
Tributary: SHOAL CREEK, SHORT CREEK, SPRING RIVER, UNNAMED STREAM, WILLOW CREEK, TURKEY CREEK, CENTER CREEK, SHAWNEE CREEK, BRUSH CREEK, LITTLE SHAWNEE CREEK
Pollutant: BIOLOGY DUE TO; CADMIUM, COPPER, LEAD, ZINC
State: KS **HUC:** 11070207
BASIN: Neosho River Basin
Submittal Date: 4/21/2005
Approved: Yes

Submittal Letter

State submittal letter indicates final TMDL(s) for specific pollutant(s)/water(s) were adopted by the state, and submitted to EPA for approval under section 303(d) of the Clean Water Act.

A letter submitting this TMDL for approval, dated April 19, 2005, was received by EPA on April 21, 2005. A revised version was submitted by email on May 25, 2005.

Water Quality Standards Attainment

The water body's loading capacity for the applicable pollutant is identified and the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources is described. TMDL and associated allocations are set at levels adequate to result in attainment of applicable water quality standards.

The macro invertebrate community shows signs of impairment from the metal loading. The Macro invertebrate Biotic Index provides a measure of the aquatic life integrity and diversity. An index of 4.5 or below indicates a fully supported aquatic life community, whereas, a value of 5.4 or greater indicates a condition of non-support. Values between reflect partially supporting conditions. An additional indicator, EPT, is the proportion of total species that comprise the Orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). These taxa indicate good quality water, and a large number of these indicate a biological community of high integrity.

The loading capacity is defined by the numeric water quality criteria for copper, cadmium, lead, and zinc, which are hardness dependent. The endpoint is for the total copper, cadmium, lead, and zinc concentrations to remain below the acute criteria for any flow. A significant relationship was found between flow and hardness and the resulting equations were used to derive a load duration curve.
The endpoints were determined using the 90% lower confidence limit of the mean total hardness, represented by the five flow categories. The acute criteria or Criterion Maximum Concentration endpoints will be the focus of achievement at high flows exceeded 10% of the time or less. The chronic criteria (Criterion Continuous Concentration) endpoints will be the focus at lower flow conditions.

Numeric Target(s)

Submittal describes applicable water quality standards, including beneficial uses, applicable numeric and/or narrative criteria. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, site specific if possible, was developed from a narrative criterion and a description of the process used to derive the target is included in the submittal.

The TMDL describes all applicable WQS and the beneficial uses: the impaired use is the expected aquatic life use. The target is the water quality criteria for acute lead, copper, zinc, and cadmium at high flows exceeded 10% of the time or less and chronic criteria will focus at lower flow conditions.
MBI target is an index of 4.5 or below.

Numeric Target(s) and Pollutant(s) of concern

An explanation and analytical basis for expressing the TMDL through surrogate measures (e.g., parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae) is provided, if applicable. For each identified pollutant, the submittal describes analytical basis for conclusions, allocations and margin of safety that do not exceed the load capacity.

The target is the water quality criteria for acute toxicity; the link between the target and each criterion is hardness dependent. The observed hardness at various flow conditions were used to establish the targets. The load duration curve was used to calculate the TMDL in general because it relies on measured water quality data, paired water hardness data, and five categories of flow exceedance data representing a complete range of anticipated flows. In calculating the TMDL the average condition was considered to establish the endpoint and desired reduction. The target levels are represented graphically by the integrated area under the load duration curves.

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Source Analysis

Important assumptions made in developing the TMDL, such as assumed distribution of land use in the watershed, population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources, are described. Point, non point and background sources of pollutants of concern are described, including magnitude and location of the sources. Submittal demonstrates all significant sources have been considered.

Land use and sources in the watershed are described. There are four discharging facilities. The extensive mining in the area has affected both surface and groundwater resources. The metals in Spring River are elevated because of these mining influences. All significant sources were discussed.

Allocation

Submittal identifies appropriate wasteload allocations for point, and load allocations for nonpoint sources. If no point sources are present the wasteload allocation is zero. If no nonpoint sources are present, the load allocation is zero.

Impairments in the water column are notably absent at low flows exceeded 90% of the time or more. Implementation of this TMDL will concentrate initially on achievement of acute criteria at high flows exceeded 10% of the time or less, while chronic criteria will be the focus of achievement at any lower flow conditions, see appendix B. Major contributing sources needing reductions, at Baxter Springs, are listed in table 27. All reductions are summarized in table 24. Loads and concentrations change with stream flow levels, load reductions were examined under each of the five flow conditions. (Example: at 10% flow Baxter Springs has a 2,205 ug/l reduction in lead or 98 %.)

A MBI value of 4.5 or below will be expected at the Baxter Springs biological monitoring station and the percent EPT taxa among the macro invertebrates sampled at Baxter Springs will be 40% or more. The chemical criteria for chronic and acute metal concentrations, will serve as the first effort at restoring the biological integrity of these streams.

WLA Comment

Analysis of the impairments under various flow conditions reveals little exceedance of the metal criteria at lowest flows when point source impacts might be most significant. The initial wasteload allocations will be set at zero. WLAs will be reexamined and established in 2008 through revision of this TMDL prior to expiration of the existing NPDES permits.

LA Comment

The necessary load reductions were examined under each of the five flow conditions. The reductions necessary at these flow conditions are calculated to achieve desired endpoints (acute criteria at high flows, chronic criteria at low flows). There are three aspects of load reduction necessary: 1) Achieve water quality criteria under moderate and high flow conditions on the individual stream reaches, 2) Reduce meal loads from tributaries that contribute to the impaired condition seen at Baxter Springs, and 3) Remove contaminated sediments form the channel bed at selected locations to lower high flow exceedances of metals. (example reduction: Baxter Springs, 2,205 ug/l lead reduction, or 98%)

Margin of Safety

Submittal describes explicit and/or implicit margin of safety for each pollutant. If the MOS is implicit, the conservative assumptions in the analysis for the MOS are described. If the MOS is explicit, the loadings set aside for the MOS are identified and a rationale for selecting the value for the MOS is provided.

The Margin of Safety is implicit and derived from the following two conservative estimates: 1.) designating the existing conditions of metal concentrations as the upper quartile (75%) value around the sample means segregated by flow condition, 2.) endpoints are established using the lower 90% confidence limit of the mean total hardness in each flow range. These conservative assumptions, result in a calculated percent reduction established using median values for the existing conditions and hardness in each category. The TMDL states that the margin of safety is explicit. The margin of safety, as written is implicit, but an explicit margin of safety can be calculated from the data provided.

Additionally, the use of biological indices and upstream/downstream comparative studies will serve to confirm improved biological communities in response to load reductions.

Seasonal Variation and Critical Conditions

Submittal describes the method for accounting for seasonal variation and critical conditions in the TMDL(s).

Seasonal variation and critical conditions are considered in the use of the load duration curve methodology which accounts for loads at all flow conditions. Seasonal variations are accounted for by the persistent presence of elevated metal concentrations throughout the year. The Biological data taken during the warm weather period reflects the carryover impact of previous loadings. Mussels live for extended number of years and serve as long term indictors.

Public Participation

Submittal describes public notice and public comment opportunity, and explains how the public comments were considered in the final TMDL(s).

A public hearing on the Neosho Basin TMDLs was held in Burlington on September 30, 2004. Public meetings to discuss the Neosho Basin TMDLs were held in January 30, 2004, July 30, 2004, and September 30, 2004. The TMDL was public noticed on the KDHE TMDL web site: http://www.kdhe.state.ks.us/TMDL.

Monitoring Plan for TMDL(s) Under Phased Approach

The TMDL identifies the monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of WQS, and a schedule for considering revisions to the TMDL(s) (where phased approach is used).

KDHE will continue to collect bimonthly samples from permanent and rotational stations in the Spring River Watershed. KDHE will also continue biological and mussel tissue sampling operations in the watershed. The results form the 2004-2005 sampling for the Natural Resource Damage Assessment will be fully compiled and analyzed by KDHE in 2006.

Monitoring of metal levels in effluent will be a condition of NPDES and state permits for discharging facilities. This monitoring will continually assess the contributions of metals in the wastewater effluent released to the streams, upstream of Baxter Springs.

Reasonable assurance

Reasonable assurance only applies when reductions in nonpoint source loading is required to meet the prescribed waste load allocations.

Reasonable assurance, although not necessary for this TMDL since the point source contribution is inconsequential, includes numerous authorities and funding through the Kansas Water Plan.